

**Commercial Standard**

**CS45-55**

SUPERSEDES CS45-48

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## **Douglas Fir Plywood**

A RECORDED VOLUNTARY STANDARD OF THE TRADE

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**UNITED STATES DEPARTMENT OF COMMERCE**

**Sinclair Weeks, Secretary**



**U. S. DEPARTMENT OF COMMERCE**

**SINCLAIR WEEKS, Secretary**

**Prepared by**

**OFFICE OF TECHNICAL SERVICES**

**Commodity Standards Division**

**In cooperation with**

**NATIONAL BUREAU OF STANDARDS**

# Douglas Fir Plywood

(NINTH EDITION)

[Effective February 1, 1955]

## 1. PURPOSE

1.1. Because of the extended application of Douglas fir plywood to a large number of new uses, the standard grading rules given herein are offered as a universal basis of understanding in the industry. General adoption and use of this standard will facilitate procurement of the proper grade of material and the proper type as to moisture resistance for its varied uses, and provide a better understanding between buyer and seller. Architects, engineers, contractors, industrial users, and home owners will thus be able to specify their needs from nationally accepted grading standards.

## 2. SCOPE

2.1. These rules cover 7 grades and 2 special items of Interior type and 7 grades of Exterior type Douglas fir plywood, which is a laminated board suitable for paneling, sheathing, subflooring, exterior siding, concrete forms, cabinet work, and for many other structural and industrial uses. The standard includes tests, standard sizes, size tolerances, reinspection rules, grade-marking provisions, and nomenclature and definitions. It also provides descriptions and rules governing the manufacture of overlaid plywood.

## 3. DEFINITION

3.1. Douglas fir plywood is a built-up board of laminated veneers in which the grain of each piece is at right angles to the one adjacent to it. The kiln-dried veneer is united under high pressure with a bonding agent, making the joints as strong as or stronger than the wood itself. The alternating direction of the grain of each contiguous layer of wood equalizes the strains, and in this way minimizes shrinkage and warping of the product, and prevents splitting. Overlaid plywood is produced in a like manner with the special facings added.

## 4. REQUIREMENTS

4.1. *Workmanship.*—Unless otherwise specified, plywood shall be sanded on two sides to meet requirements of veneer as set forth in paragraph 4.4.4. When specified rough or unsanded, plywood may have paper tape on either face or back, or on both. It shall be well manufactured and be free from blisters, laps, and defects, except as permitted in the specific rules for the various grades. Exposed veneer on both sides of panel shall have the bark or tight surface out. Plies directly under surfaces of overlaid panels are not considered exposed veneers.

4.2. *Bonding.*—The entire area of each contacting surface of the plywood shall be bonded in an approved manner with material best adapted to each use classification. No tape shall be used in any glue line.

4.3. *Loading or packing.*—The plywood shall be securely loaded or packed to insure delivery in a clean and serviceable condition.

4.4. *Types of plywood.*—Douglas fir plywood is made in two types, Interior (Int.) and Exterior (Ext.), with the type referring to the moisture resistance of the adhesives bonding the plies together. Within each type there are several grades, which are established by the quality of the veneer on both faces of the panel as hereinafter defined. The grade descriptions set forth the minimum requirements, and, therefore, the majority of panels in any shipment will exceed the specification given.

4.4.1. *Moisture content.*—Moisture content of panels at time of shipment from mill shall not exceed 18 percent of dry weight as determined by oven-dry test.

4.4.2. *Veneers.*—Veneers shall be  $\frac{1}{12}$  in. or more thick before sanding in panels  $\frac{1}{4}$  in. and thicker, except that veneers  $\frac{1}{16}$  in. thick before sanding may be used in 5-ply,  $\frac{3}{8}$ -in.-thick Exterior type panels. The veneer in any particular classification, as set forth in paragraph 4.4.4, shall not contain any defect larger than those permitted specifically therein, or that will significantly impair either the strength or the serviceability of the panel. Sound firm stain shall not be considered a defect.

4.4.3. *Ring count.*—A minimum of six annular rings per inch, as measured in block at time of peeling, shall be required for both faces of all grades.

4.4.4. *Veneer classification.*—All veneers used in the different plywood grades shall be one of the following (grade A being the best of the four veneers):

4.4.4.1. *Grade A veneer* shall be of one or more pieces of firm, smoothly cut veneer. When of more than one piece, the pieces shall be well joined. The veneer shall be free from knots, open splits, pitch pockets, and other open defects. Pitch streaks averaging not more than  $\frac{3}{8}$  in. in width and blending with color of wood, discolorations, sapwood, shims, and neatly made patches shall be admitted, but not more than 18 veneer patches shall occur in any 4-ft. by 8-ft. A face, with proportionate limits for other sizes of panels. Shims may not be used over or around patches. Any multiple repair in a panel shall be limited to two patches. All patches and repairs must run parallel to the grain. However, approved plastic fillers may be used to fill small cracks or checks not more than  $\frac{1}{32}$  in. wide; to fill small splits or openings up to  $\frac{1}{16}$  in. wide if not exceeding 2 inches in length; and also to fill small chipped areas or openings not more than  $\frac{1}{8}$  in. wide by  $\frac{1}{4}$  in. long. This grade shall present a smooth surface suitable for painting.

4.4.4.2. *Grade B veneer* shall present a solid surface, free from open defects except as noted, but in addition to characteristics admitted in grade A, the veneer shall admit also neatly made circular plugs, as well as synthetic plugs that present solid, level, hard surfaces; knots up to 1 in. if both sound and tight; splits not wider than  $\frac{1}{32}$  in.; slightly rough but not torn grain; and other minor sanding and patching defects, including sander skips not exceeding 5 percent of panel area. Tiny vertical holes not exceeding  $\frac{1}{16}$  in. in diameter and caused by

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**DOUGLAS FIR PLYWOOD**  
**COMMERCIAL STANDARD CS45-55**

**AMENDMENT**

The Standing Committee for CS45-55 has approved the following amendment to the Commercial Standard in order to provide for Medium Density Overlay with C Grade inner plies. All acceptors have been notified and none have filed objections. Accordingly, the amendment outlined below will become effective July 20, 1957.

Table 3.--Overlaid Plywood--Minimum Quality of Veneers

Grade	Face <sup>1</sup>	Back <sup>1</sup>	Inner plies
A-A, Ext.--High density overlay.....	A	A	B
B-B, Ext.--High density overlay.....	B	B	B
B-B, Ext.--High density concrete form overlay..	B	B	B
B-B, Ext.--Medium density overlay.....	B	B	<del>B</del> C <sup>2</sup>
<del>B-B, Ext.--Medium density concrete form overlay</del>	<del>B</del>	<del>B</del>	<del>B</del>

<sup>1</sup>For overlaid plywood the grade designation for face or back refers to the veneer directly underlying the surface. All overlaid plywood is surfaced on 2 sides unless otherwise specified. When only 1 side is surfaced, the exposed back may be C or better.

<sup>2</sup>Medium Density Overlay also available with B Grade inner plies.

9.6 When ordering overlaid plywood, high density overlay, medium density overlay, or overlaid plywood concrete form should be specified. The number of pieces, size, and thickness are noted in the same way as for other kinds of plywood. Special requirements, such as High Density A-A, Medium Density B Inner Plies, surfaced 1 side only, or special weights of surfacing material, should be stated after the standard specification.

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B-B, Ext.--High density concrete form overlay..	B	B	B
B-B, Ext.--Medium density overlay.....	B	B	<del>B</del> C <sup>2</sup>
<del>B-B, Ext.--Medium density concrete form overlay</del>	<del>B</del>	<del>B</del>	<del>B</del>

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<sup>2</sup>Medium Density Overlay also available with B Grade inner plies.

9.6 When ordering overlaid plywood, high density overlay, medium density overlay, or overlaid plywood concrete form should be specified. The number of pieces, size, and thickness are noted in the same way as for other kinds of plywood. Special requirements, such as High Density A-A, Medium Density B Inner Plies, surfaced 1 side only, or special weights of surfacing material, should be stated after the standard specification.

ambrosia beetles are admissible if not exceeding an average of 1 per sq. ft. in number; also admissible are horizontal or surface tunnels, which shall be limited to  $\frac{1}{16}$  in. across, 1 in. in length, and to 12 in number in a 4-ft. by 8-ft. panel, or proportionately in panels of other dimensions.

4.4.4.3. *Grade C* veneer may contain knotholes not larger than 1 in. in least dimension, open pitch pockets not wider than 1 in., splits not wider than  $\frac{3}{16}$  in. that taper to a point, worm or borer holes not more than  $\frac{5}{8}$  in. wide or  $1\frac{1}{2}$  in. long, knots if tight and not more than  $1\frac{1}{2}$  in. in least dimension, and plugs, patches, shims, sanding defects, and other characteristics in number and size that will not impair the serviceability of the panel.

4.4.4.4. *Grade D* veneer (may be used only in Interior type panels) shall contain no knotholes greater than  $2\frac{1}{2}$  in. in maximum dimension; no pitch pockets more than 2 in. wide by 4 in. long, or of equivalent area if of lesser width; and no splits wider than  $\frac{1}{2}$  in. Splits  $\frac{1}{2}$  in. wide at widest point may be one-fourth-panel length, those not more than  $\frac{1}{4}$  in. wide at widest point may be half-panel length, and those not more than  $\frac{3}{16}$  in. wide may be full-panel length, but all splits shall taper to a point at one end. Any number of plugs, patches, shims, worm or borer holes, sanding defects, and other characteristics are permitted provided they do not seriously impair the strength or serviceability of the panel.

4.4.5. *Overlays*.—Overlaid plywood is Douglas fir plywood to which has been added resin-impregnated fiber faces on one or both sides. It is made in two types, "high density" and "medium density," with the type referring to the surfacing material as hereinafter defined. The resin-impregnated faces are permanently fused to the base panel under heat and pressure. Although designed for either exterior or interior service, all overlaid plywood is made in the Exterior type. This refers to the adhesive bond between plies, between the overlay surface and the base panel, and to the durability of the surface itself.

4.4.5.1. *High density type*.—The surfacing on the finished product shall be hard, smooth, and of such character that further finishing by paint or varnish is not required. It shall consist of a cellulose-fiber sheet or sheets, in which not less than 40 percent by weight of the laminate shall be a thermosetting resin of the phenol or melamine type. The resin-impregnated material shall be not less than 0.009 in. thick and shall weigh not less than 60 pounds per 1,000 sq. ft. of single face, including both resin and fiber. The resin impregnation shall be sufficient to attach the surfacing material to the plywood. This bond shall be equal in performance to the glue lines between the sheets of veneer which make up the plywood. The overlay face usually comes in natural translucent color, but certain other colors are available or may be used by manufacturers for identification.

4.4.5.2. *Medium density type*.—The resin-impregnated facing on the finished product shall present a smooth, uniform surface suitable for high-quality paint finishes. It shall consist of a cellulose-fiber sheet in which not less than 20 percent by weight of the laminate shall be a thermosetting resin of the phenol or melamine type. The resin-impregnated material shall be not less than 0.012 in. thick and shall weigh not less than 65 pounds per 1,000 sq. ft. of single face, including both resin and fiber. An integral phenolic resin glue line shall be applied to one surface of the facing material to bond it to the plywood. This bond shall be equal in performance to the glue lines between the

sheets of veneer which make up the plywood. The overlay face shall be a solid color. Some evidence of the underlying grain may appear, but, compared to the nature of the "high density" surface, there shall be no consistent show-through.

4.5. *Interior type plywood.*—This type of plywood has a high degree of moisture resistance, and is suitable for constructions where its application requires that it shall retain its original form and practically all its strength when occasionally subjected to a thorough wetting and subsequent normal drying; it is also suitable for constructions where subjected to occasional deposits of moisture by condensation through walls or leakage, or from other sources. All veneer used in Interior type shall be of Douglas fir, except that Western hemlock, Sitka spruce, noble fir, commercial white fir, Alaskan cedar, Port Orford cedar, California redwood, ponderosa pine, sugar pine, Idaho white pine, and Western larch may be used for inner plies only in Interior type grades A-A, A-B, A-D, B-D, and the special "natural finish" items (see table 1). Plywood of this type shall meet the test requirements set forth in paragraphs 5.2 and 5.4.1. This type is available in the grades given in table 1.

NOTE.—Interior Sheathing, Underlayment, and Concrete Form grades shall be made with an adhesive possessing a mold resistance equivalent to that created by adding 5 pounds of pentachlorophenol, or its sodium salt, per 100 pounds of dry glue base, to plain protein glues.

TABLE 1. *Interior type grades—minimum quality of veneers*

Grade	Face	Back	Inner plies	Additional limitations <sup>1</sup>
A-A, Int. ....	A .....	A .....	D .....	Sanded 2 sides.
A-B, Int. ....	A .....	B .....	D .....	Do.
A-D, Int. ....	A .....	D .....	D .....	Do.
B-D, Int. ....	B .....	D .....	D .....	Do.
C (Repaired)-D, Int. (Underlayment, Int.).	C (Repaired) <sup>2</sup>	D .....	C <sup>3</sup> or D .....	Do.
C-D, Int. (Sheathing, Int.) .....	C .....	D .....	D .....	Unsanded grade. No belt sanding permissible.
B-B, Int. (Concrete Form, Int.). <sup>4</sup>	B .....	B .....	C <sup>4</sup> (all inner plies).	Edge-sealed and, unless otherwise specified, mill-oiled. Sanded 2 sides.
N-D, Int. (Natural Finish One Side). <sup>5</sup>	Special <sup>5</sup> .....	D .....	D .....	Sanded 2 sides.
N-N, Int. (Natural Finish Two Sides). <sup>6</sup>	Special <sup>6</sup> .....	Special <sup>6</sup>	B <sup>7</sup> .....	Do.

<sup>1</sup> See also paragraphs 4.4 and 4.5.

<sup>2</sup> Face may contain knotholes, worm or borer holes, and other open defects not larger than ¼ by ½ in., sound and tight knots up to 1½ in. in greatest dimension, splits up to ¼ in. wide, ruptured and torn grain, sander skips up to 5 percent of panel area, pitch pockets if solid and tight, plugs, patches, and shims.

<sup>3</sup> Veneer immediately adjacent to face shall be C or better.

<sup>4</sup> B-B, Int., unless ordered as a Concrete Form grade or edge-sealed, may be furnished with D inner plies.

<sup>5</sup> A special order "One Side Natural Finish" item, not generally available in stock, intended primarily for paneling and wainscoting, generally only in ¼ in. thickness. Available only from certain mills. The face shall consist of smoothly cut veneer of 100 percent heartwood, free from knots, splits, pitch pockets, and other open defects; not more than 3 pieces of veneer shall be used, and they shall be well matched as to color and grain. Faces shall be of a yellow or a pinkish color without stain. Two shims, neither longer than 6 in., that occur only at the ends of panels, and not more than 4 inconspicuous well-matched small patches, not to exceed ¾ in. wide by 2½ in. long, shall be admitted. All repairs and all veneer joints shall be parallel to the edges of the panel. No overlapping of repairs is permitted. In all other respects the panel shall conform to an Interior type A-D panel.

<sup>6</sup> Also a special order "Two Sides Natural Finish" item, intended primarily for cabinet work, generally only in ¾ in. thickness. Available only from certain mills. Each face shall consist of veneer equivalent to face described in footnote 5.

<sup>7</sup> All inner plies shall consist of B veneer with crossbands jointed.

4.6. *Exterior type plywood.*—This type represents the ultimate in moisture resistance—a plywood that will retain its original form and strength when repeatedly wet and dried and otherwise subjected to the elements, and which is suitable for permanent exterior use. It



shall be free from both core gaps and core voids that impair the strength or serviceability of the panel. All repatches and shims shall be set with adhesives meeting performance standards for Exterior plywood. All veneer used in Exterior type panels shall be of Douglas fir and of *C* grade as defined in paragraph 4.4.4, or better. All Exterior panels shall be so designated by a distinctive symbol, "Ext," branded or stamped on the edge of each panel. Plywood of this type shall meet the test requirements set forth in paragraphs 5.3, 5.4.2, and 5.4.3. This type is available in the grades given in table 2.

TABLE 2. *Exterior type grades—minimum quality of veneers*

Grade	Face	Back	Inner plies	Additional limitations <sup>1</sup>
A-A, Ext.-----	A-----	A-----	C-----	Sanded 2 sides.
A-B, Ext.-----	A-----	B-----	C-----	Do.
A-C, Ext.-----	A-----	C-----	C-----	Do.
B-C, Ext.-----	B-----	C-----	C-----	Do.
C (Repaired)-C, Ext. (Under- layment, Ext.).	C (Repaired) <sup>2</sup>	C-----	C-----	Do.
C-C, Ext. (Sheathing, Ext.)-----	C-----	C-----	C-----	Unsanded grade. No belt sanding permissible.
B-B, Ext. (Concrete Form, Ext.)-----	B-----	B-----	C-----	Edge-sealed and, unless other- wise specified, mill-oiled. Sanded 2 sides.

<sup>1</sup> See also paragraphs 4.4 and 4.6.

<sup>2</sup> Face may contain knotholes, worm or borer holes, and other open defects not larger than ¼ by ½ in., sound and tight knots up to 1½ in. in greatest dimension, splits up to ¼ in. wide, ruptured and torn grain, sander skips up to 5 percent of panel area, pitch pockets if solid and tight, plugs, patches, and shims.

4.7. *Overlaid plywood.*—Table 3 gives the types of overlaid plywood that are available.

TABLE 3. *Overlaid plywood—minimum quality of veneers*

Grade	Face <sup>1</sup>	Back <sup>1</sup>	Inner plies
A-A, Ext.—High Density Overlay-----	A	A	B
B-B, Ext.—High Density Overlay-----	B	B	B
B-B, Ext.—High Density Concrete Form Overlay-----	B	B	B
B-B, Ext.—Medium Density Overlay-----	B	B	B
B-B, Ext.—Medium Density Concrete Form Overlay-----	B	B	B

<sup>1</sup> For overlaid plywood the grade designation for face or back refers to the veneer directly underlying the surface. All overlaid plywood is surfaced on 2 sides unless otherwise specified. When only 1 side is surfaced, the exposed back may be *C* or better.

## 5. SAMPLING AND TESTING

5.1. *Sampling.*—Ten test panels shall be taken at random from any shipment. The test panels shall be selected to represent as many variations in grades and thicknesses as possible. They shall also be selected from locations distributed as widely as is practicable throughout the shipment. From each Exterior panel selected, 3 test pieces shall be cut at random and from each test piece 10 test specimens shall be cut. From each Interior panel selected, a 6-in. by 6-in. test piece shall be cut from each end approximately at midwidth of the panel, and from each edge approximately at midlength of the panel; a fifth piece shall be cut from somewhere near the middle or center of the panel. Overlaid plywood shipments shall be sampled in the same manner as Exterior plywood.

5.2. *Test for Interior type.*—The test pieces shall be submerged in water at room temperature for a period of 4 hours, and then dried at a temperature not to exceed 100° F for a period of 20 hours. This cycle shall be repeated until all samples have failed, or have completed 15 cycles.

5.3. *Test for Exterior type.*

5.3.1. *Cold soaking test.*—Five shear specimens shall be cut from each test piece as shown in figure 1.

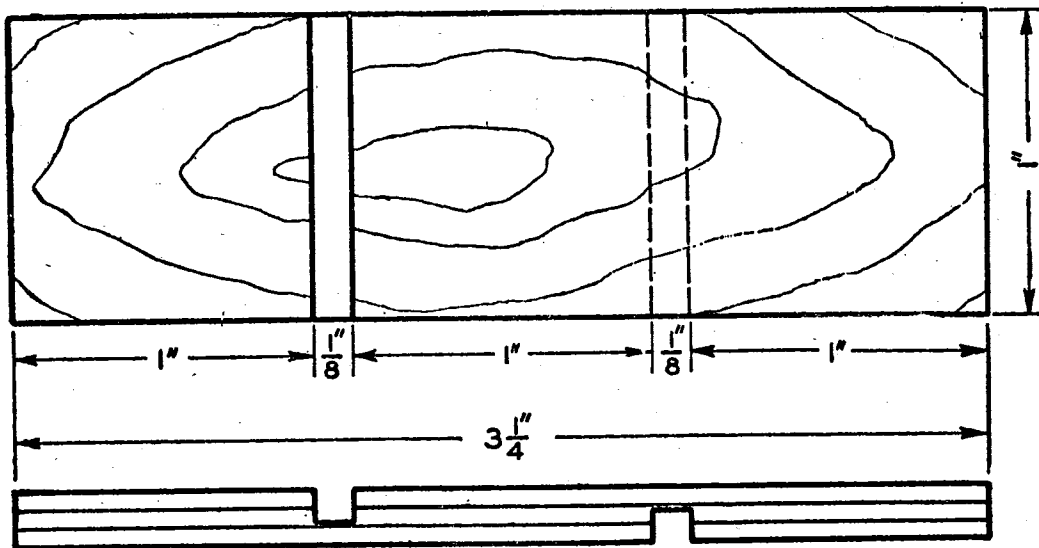


FIGURE 1. *Shear specimen.*

If the number of plies exceeds 3, the cuts shall be made so as to test any two of the joints, but the additional plies need not be stripped except as demanded by the limitations of the width of the retaining jaws on the testing device. When desired, special jaws may be constructed to accommodate the thicker plywood. If the number of plies exceeds 3, the choice of joints to be tested shall be left to the discretion of the inspector, but at least one-half of the tests shall include the innermost joints. The specimens shall be submerged in water at room temperature for a period of 48 hours and dried for 8 hours at a temperature of 145° F ( $\pm 5^\circ$  F), and then followed by two cycles of soaking for 16 hours and drying for 8 hours under the conditions described above. The shear specimens shall be soaked again for a period of 16 hours and tested while wet in a shear testing device, as illustrated in figure 2, by placing them in the jaws of the device, to which a load shall be applied at the rate of 600 to 1,000 pounds a minute until failure. The percentage of wood failure of the specimens shall be estimated.

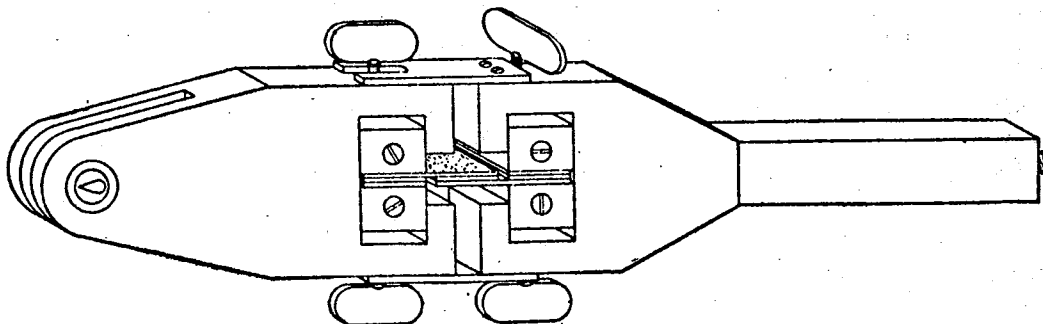


FIGURE 2. *Jaws for shear test.*

Overlaid plywood shall be evaluated in an identical manner, but in addition to estimating wood failure at the plywood glue lines tested, specimens shall be examined for separation of the resin-impregnated face from the plywood.

5.3.2. *Boiling test.*—Shear specimens shall be taken as described in paragraph 5.3.1, boiled in water for 4 hours, and then dried for 20 hours at a temperature of  $145^{\circ}\text{F}$  ( $\pm 5^{\circ}\text{F}$ ). The shear specimens shall be boiled again for a period of 4 hours and tested while wet, as described in paragraph 5.3.1. The percentage of wood failure of the specimens shall be estimated.

Overlaid plywood shall be subjected to the above cycles and evaluated as described in paragraph 5.3.1.

5.3.3. *Fire test.*—A  $5\frac{1}{2}$ -in. by 8-in. piece shall be taken from each of 5 selected test panels and it shall be placed on the stand as illustrated in figure 3, and subjected to an  $800^{\circ}$  to  $900^{\circ}\text{C}$  flame from a Bunsen-type burner for a period of 10 minutes or, in the case of a thin specimen, until a brown char area appears on the back side. The burner

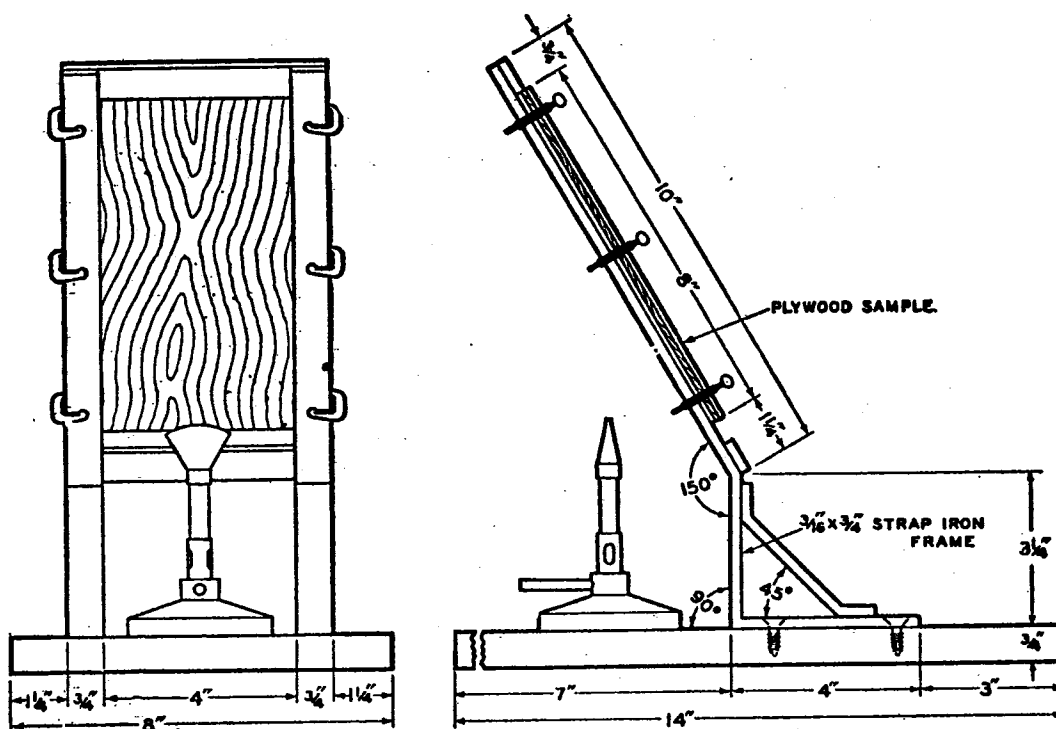


FIGURE 3. Apparatus for fire test.

shall be equipped with a wing top to envelop the entire width of the specimen in flame. The top of the burner shall be 1 inch from the specimen face and the flame  $1\frac{1}{2}$  in. high.

The flame shall impinge on the face of the specimen 2 in. from the bottom end. After the test the sample shall be removed from the stand and the glue lines examined for delamination by separating the charred plies with a sharp chisel-like instrument. Any delamination due to combustion shall be considered as failure, except when occurring at a localized defect permitted in the grade. When testing overlaid plywood, blisters or bubbles in the surface caused by combustion shall not be considered delamination.

#### 5.4. Interpretation of tests.

5.4.1. *Interior type.*—Total visible delamination of  $\frac{1}{4}$  in. or more in depth, and over 2 in. in length along the edge of a 6-in. by 6-in. test piece shall be considered as failure. When delamination occurs at a localized defect permitted within the grade, that test piece shall be discarded. The average number of cycles which the test pieces shall withstand is 10 or more, and at least 85 percent of the specimens shall withstand 3 cycles. If the test pieces fail to meet these requirements, an additional 10 panels shall be selected and tested as described in paragraphs 5.1 and 5.2. Then the test pieces from both groups of 10, considered together, shall meet the above test requirements.

5.4.2. *Exterior type.*—Specimens cut through localized defects permitted in the grade shall be discarded. A test piece shall be rated by the combined results of both the cold soaking test and the boiling test—generally 10 specimens in all. If the average wood failure of the 10 specimens is below 60 percent, or if more than 1 of the specimens is below 30 percent, the test piece fails. If more than 1 test piece fails, that panel fails. If 1 or none of the 10 panels fails, the shipment is accepted; if more than 2 fail, the shipment is rejected. If 2 fail, another series of 10 panels is tested. If 1 or none of the panels fails in this series, the shipment is accepted; otherwise it is rejected. If the average wood failure of the first 10 panels is less than 80 percent, a second series of 10 is tested regardless of the number of failures. If the average wood failure of the 20 panels combined is less than 80 percent, the shipment is rejected.

The same interpretation shall apply to overlaid plywood. In addition, separation of the resin-impregnated face from the plywood shall be considered failure.

5.4.3. If more than 1 panel fails the fire test, the shipment may be rejected; if 1 panel fails, a second series of 5 shall be tested, all of which must pass.

### 6. STANDARD STOCK SIZES <sup>1</sup>

6.1. Douglas fir plywood is commonly made in the sizes listed in tables 4, 5, and 6, but other sizes, including 4-, 14-, and 16-ft. lengths, may also be available from mills on order.

TABLE 4. *Standard stock Douglas fir plywood sizes—Interior type*

Grade	Width (in.) <sup>1</sup>	Length (in.) <sup>1</sup>	Thickness (in.) <sup>2 3 4</sup>			
A-A, Int.....	36	72	$\frac{1}{4}$	—	—	$\frac{3}{4}$
		96	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		72	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		84	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		96	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
Do.....	48	108	$\frac{1}{4}$	$\frac{3}{8}$	—	$\frac{3}{4}$
		120	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		144	$\frac{1}{4}$	—	—	$\frac{3}{4}$
		144	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
A-B, Int.....	36	96	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		72	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		84	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		96	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		108	$\frac{1}{4}$	$\frac{3}{8}$	—	$\frac{3}{4}$
Do.....	48	120	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
		144	$\frac{1}{4}$	—	—	$\frac{3}{4}$
		60	—	—	—	$\frac{3}{4}$
		72	—	—	—	$\frac{3}{4}$
A-D, Int.....	30	84	$\frac{1}{4}$	—	—	$\frac{3}{4}$
		96	$\frac{1}{4}$	—	—	$\frac{3}{4}$
		120	—	—	—	$\frac{3}{4}$

See footnotes at end of table.

<sup>1</sup> Sizes most commonly available from distributors.

TABLE 4. *Standard stock Douglas fir plywood sizes—Interior type—Continued*

Grade	Width (in.) <sup>1</sup>	Length (in.) <sup>1</sup>	Thickness (in.) <sup>2 3 4</sup>					
A-D, Int.-----	36	60						3/4
		72	1/4	3/8	1/2	5/8		3/4
		84	1/4	3/8	1/2	5/8		3/4
		96	1/4	3/8	1/2	5/8		3/4
		120	1/4					3/4
		60	1/4	3/8	1/2	5/8		3/4
Do-----	48	72	1/4	3/8	1/2	5/8		3/4
		84	1/4	3/8	1/2	5/8		3/4
		96	1/4	3/8	1/2	5/8		3/4
		108	1/4	3/8	1/2	5/8		3/4
		120	1/4	3/8	1/2	5/8		3/4
		144	1/4	3/8	1/2	5/8		3/4
B-B (Concrete Form, Int.)-----	48	96						3/4
B-D, Int.-----	48	84	1/4	3/8	1/2	5/8		3/4
C (Repaired)-D (Underlayment Int.)-----	48	96	1/4	3/8	1/2	5/8		3/4
C-D (Sheathing, Int.), unsanded-----	48	96	5/16	3/8	1/2	5/8		3/4
		120	5/16					3/4

<sup>1</sup> A tolerance of 1/32 (0.0312) in. over or under the specified width and/or length shall be allowed, but all panels, including overlays, shall be square within 1/8 (0.125) in. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 in. of panel edge.

<sup>2</sup> A tolerance of 1/64 (0.0156) in. over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) in. on unsanded and overlaid panels.

<sup>3</sup> Minimum number of plies required for standard construction:

3 plies for 1/4-, 5/16-, and 3/8-in.

5 plies for 1/2-, 5/8-, and 3/4-in.

7 plies for 7/8- to 1 1/16-in.

<sup>4</sup> Sanded 2 sides, except C-D (Sheathing).

NOTE.—Any size panel conforming in all other respects to the various requirements of this standard shall be considered as conforming to this standard.

TABLE 5. *Standard stock Douglas fir plywood sizes—Exterior type*

Grade	Width (in.) <sup>1</sup>	Length (in.) <sup>1</sup>	Thickness (in.) <sup>2 3 4</sup>					
A-A, Ext.-----	48	60	1/4	3/8	1/2	5/8	3/4	
		84	1/4	3/8	1/2	5/8	3/4	
		96	1/4	3/8	1/2	5/8	3/4	7/8
		108	1/4	3/8	1/2	5/8	3/4	
		120	1/4	3/8	1/2	5/8	3/4	
		144	1/4	3/8	1/2	5/8	3/4	
A-B, Ext.-----	48	84	1/4	3/8			3/4	
		96	1/4	3/8	1/2	5/8	3/4	
		120	1/4	3/8	1/2	5/8	3/4	
		144	1/4	3/8	1/2		3/4	
A-C, Ext.-----	36	96	1/4	3/8	1/2	5/8	3/4	
Do-----	48	72	1/4	3/8	1/2	5/8	3/4	
		84	1/4	3/8	1/2	5/8	3/4	
		96	1/4	3/8	1/2	5/8	3/4	
		108	1/4	3/8	1/2	5/8	3/4	
		120	1/4	3/8	1/2	5/8	3/4	
		144	1/4	3/8	1/2	5/8	3/4	
B-B (Concrete Form, Ext.)-----	48	96				5/8	3/4	
C (Repaired)-C (Underlayment, Ext.)-----	48	96	1/4	3/8	1/2	5/8	3/4	
C-C (Sheathing, Ext.)-----	48	96	5/16	3/8	1/2	5/8	3/4	

<sup>1</sup> A tolerance of 1/32 (0.0312) in. over or under the specified width and/or length shall be allowed, but all panels, including overlays, shall be square within 1/8 (0.125) in. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 in. of panel edge.

<sup>2</sup> A tolerance of 1/64 (0.0156) in. over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) in. on unsanded and overlaid panels.

<sup>3</sup> Minimum number of plies required for standard construction:

3 plies, for 1/4-, 5/16-, and 3/8-in.

5 plies for 1/2-, 5/8-, and 3/4-in.

7 plies for 7/8- to 1 1/16-in.

<sup>4</sup> Sanded 2 sides, except C-C (Sheathing).

NOTE.—Any size panel conforming in all other respects to the various requirements of this standard shall be considered as conforming to this standard.

TABLE 6. *Standard stock Douglas fir plywood sizes—overlaid plywood*

Grade	Width (in.) <sup>1</sup>	Length (in.) <sup>1</sup>	Thickness (in.) <sup>2</sup>
A-A—High Density, Ext. ....	36	96	5/16 (3-ply). <sup>3</sup> 3/8 (3-ply). 1/2 (5-ply). 9/16 (5-ply). 5/8 (5-ply). 3/4 (5-ply). 7/8 (7-ply). 1 (7-ply). 1 1/8 (7-ply).
Do. ....	48	96	Same as for grade A-A, above. 1/2 (5-ply). 5/16 (5-ply). 3/8 (5-ply). 3/4 (5-ply).
B-B—High Density, Ext. ....	{ 36 48 }	96	Same as for grade A-A, above. 1/2 (5-ply). 5/16 (5-ply). 3/8 (5-ply). 3/4 (5-ply).
B-B—High Density, Ext. (Concrete Form) .....	48	96	Same as for grade A-A, above. 1/2 (5-ply). 5/16 (5-ply). 3/8 (5-ply). 3/4 (5-ply).
B-B—Medium Density, Ext. ....	{ 36 48 }	96	Same as for grade A-A, above. 1/2 (5-ply). 5/16 (5-ply). 3/8 (5-ply). 3/4 (5-ply).
B-B—Medium Density, Ext. (Concrete Form) .....	48	96	Same as for grade A-A, above. 1/2 (5-ply). 5/16 (5-ply). 3/8 (5-ply). 3/4 (5-ply).

<sup>1</sup> A tolerance of 1/32 (0.0312) in. over or under the specified width and/or length shall be allowed, but all panels, including overlays, shall be square within 1/8 (0.125) in. All panels shall be sawn so that a straight line drawn from one corner to the adjacent corner shall fall within 1/16 in. of panel edge.

<sup>2</sup> A tolerance of 1/64 (0.0156) in. over or under the specified thickness shall be allowed on sanded panels, and a tolerance of 1/32 (0.0312) in. on unsanded and overlaid panels.

<sup>3</sup> Number of plies refers to veneers. Resin-impregnated surfaces are not included.

NOTE.—Any size panel conforming in all other respects to the various requirements of this standard shall be considered as conforming to this standard.

## 7. INSPECTION

7.1. All plywood guaranteed to conform to the Commercial Standard grading rules is sold subject to inspection in the white only, except concrete-form material, which may have a priming of oil or other preparation before shipment. All complaints regarding the quality of any shipment must be made within 15 days from receipt thereof.

7.2. If the grade of any plywood shipment is in dispute and a reinspection is demanded, the cost of such reinspection shall be borne by the seller and the shipment settled for on the basis of the reinspection report if the shipment is more than 5 percent below grade, or if it contains more than 1 percent of mismanufactured panels containing defects such as short core, lapped core, blisters, delamination, etc., which render the panel unfit for normal use. The buyer need not accept such defective panels shipped as any standard grade listed in this Commercial Standard.

7.3. If reinspection establishes the shipment to be 5 percent or less below grade, and to contain 1 percent or less of mismanufactured panels, the buyer pays the cost of reinspection and pays for the shipment as invoiced.

## 8. GRADE MARKING AND CERTIFICATION

8.1. In order to assure the purchaser that he is getting Douglas fir plywood of the grade specified, producers may individually or in concert with their trade association or inspection bureau issue certificates with each shipment, or grade-mark each panel as conforming to the standard.

8.2. The following sets forth the grade marking and certification symbols adopted by the Douglas Fir Plywood Association to preserve

the high standards of quality herein recorded. The grade-mark symbols on the plywood are to insure that the *ultimate consumer* receives the kind of plywood specified.

8.3. To identify the various grades within the Interior type of Douglas fir plywood, the following grade marks are stamped or branded on all standard size panels:

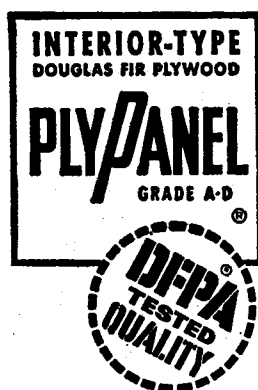
(a) Grade *A-A*, Int. panels are stamped on the edge:



(b) Grade *A-B*, Int. panels are stamped on the edge:



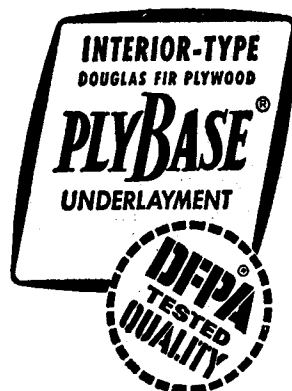
(c) "Plypanel," grade *A-D*, Int. panels are stamped on the back:



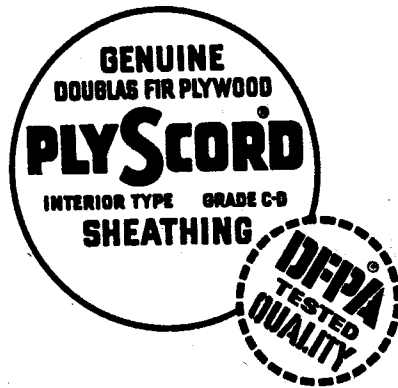
(d) Grade *B-D*, Int. panels are stamped, usually on the edge:



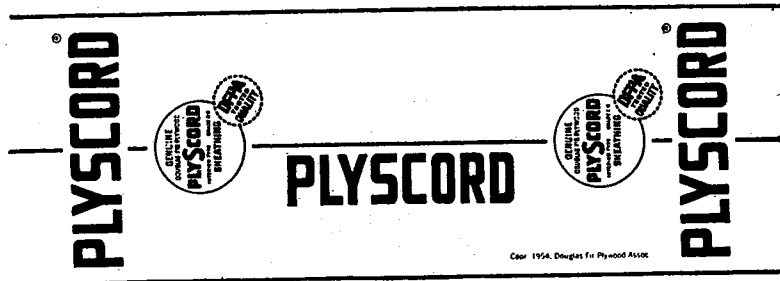
(e) "Plybase" Underlayment, grade *C (repaired)-D*, Int. panels are stamped on the back:



(f) "Plyscord," grade *C-D*, Int. panels are stamped either on the face or back:

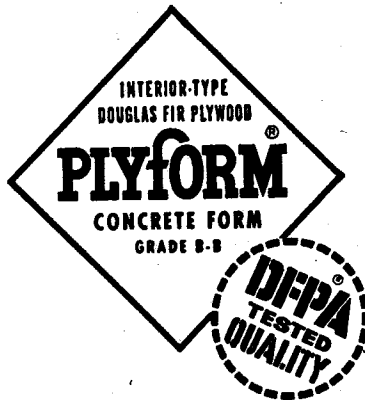


Many association mills also stamp across the entire face of a 4-ft. by 8-ft. "Plyscord" sheathing panel at each end the following:



(Lines in the above label represent scorings for nailing to framing members at 16-, 24-, 32-, or 48-in. centers.)

(g) "Plyform," grade *B-B*, Int. panels are stamped on one face:



(h) Natural Finish One Side, grade *N-D*, Int. panels are stamped on the edge:



(i) Natural Finish Two Sides, grade *N-N*, Int. panels are stamped on the edge:





8.4. To identify the Exterior type of Douglas fir plywood, the symbol "EXT-DFPA" is branded or stamped on the edge of each standard size panel. The various grades within the Exterior type are additionally identified by the following grade marks branded or stamped on the edge of each standard size panel:

(a) Grade A-A, Ext. panels are stamped on the edge:

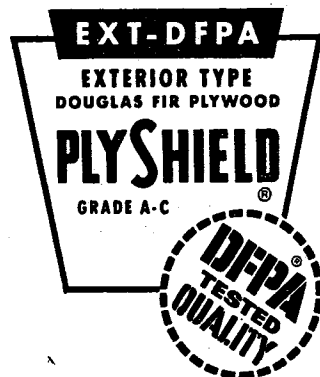
® **EXT-DFPA·A-A**

(b) Grade A-B, Ext. panels are stamped on the edge:

® **EXT-DFPA·A-B**

(c) "Plyshield," grade A-C, Ext. panels are stamped on the edge, and may also be stamped on the back:

® **EXT-DFPA·PLYSHIELD·A-C**



*Optional back stamp.*

(d) Utility, grade B-C, Ext. panels are stamped on the edge:

® **EXT-DFPA·UTILITY·B-C**

(e) Grade C (repaired)-C, Underlayment, Ext. panels are stamped on the edge:

® **EXT-DFPA·UNDERLAYMENT**

(f) Sheathing, grade C-C, Ext. panels are stamped on the edge:

® **EXT-DFPA·SHEATHING·C-C**

(g) Concrete Form, grade B-B, Ext. panels are stamped on the edge, and may also be stamped on the back:

® **EXT-DFPA · PLYFORM · B-B**



*Optional back stamp.*

(h) Each standard size overlaid panel also carries the symbol "EXT-DFPA" branded on the edge to indicate it is of Exterior type.

8.5. *Shop-cutting panel—for remanufacture only.*—Panels stamped as shown below have been rejected as not conforming to grade requirements of standard grades in this Commercial Standard. However, they may be especially suitable, through appropriate cutting, for various industrial or other uses. They are analogous to certain shop grades of lumber, also intended for cut up.

**SHOP - CUTTING PANEL  
FOR REMANUFACTURE ONLY  
DFPA®**

Delaminated or blistered panels are not considered as coming within the category covered by this stamp.

8.6. The Douglas Fir Plywood Association maintains a quality control and an inspection service for the careful grading of its members' products. The certificate of inspection, which applies *only* to Association grade-marked plywood and which is used with carload lots, is to insure that the distributor or first unloading buyer receives plywood of the type and grade specified. A facsimile of the Association's certificate is shown in figures 4 and 5.

## **9. METHOD OF ORDERING**

9.1. The established procedure in specifying size and grade of plywood is to name the number of plies, width, length, grade, moisture resistance, finished thickness, and whether sanded or unsanded.

9.2. Width always refers to the distance across the grain of the face plies; length refers to the distance along the grain. Width should always be specified first.



# Certificate of Inspection

APPLICABLE ONLY TO DFPA GRADE-TRADEMARKED PANELS

IT IS HEREBY CERTIFIED that the plywood identified below and marked with a **GRADE-TRADEMARK** of the **DOUGLAS FIR PLYWOOD ASSOCIATION (D.F.P.A.)**, was manufactured in accordance with the grade specifications established by the U. S. Department of Commerce as Commercial Standard CS 45-55, by the

ORDER NO. \_\_\_\_\_

CAR NO. \_\_\_\_\_

DATE \_\_\_\_\_

whose production bearing any of the Association grade-trademarks (see reverse side) is under the supervision of the Inspection Department of the **DOUGLAS FIR PLYWOOD ASSOCIATION**.

Signed for **DOUGLAS FIR PLYWOOD ASSOCIATION**

*[Signature]*  
Managing Director

\_\_\_\_\_  
AUTHORIZED SIGNATORY

Subscribed and declared to before me, the undersigned, a Notary Public in and for the state of \_\_\_\_\_ by the above named authorized signatory personally known to me as the person signing the above certificate.

\_\_\_\_\_  
Notary Public

Dated \_\_\_\_\_ 19\_\_\_\_

SEE REVERSE SIDE OF THIS CERTIFICATE FOR MINIATURE FACSIMILES OF GRADE-TRADEMARKS BELONGING TO SAID ASSOCIATION



Copyright 1955 Douglas Fir Plywood Association—Printed in U. S. A.

FIGURE 4. Inspection certificate of the Douglas Fir Plywood Association.

9.3. If, for example, you require 100 pieces of plywood  $\frac{1}{4}$  in. thick, 48 in. wide, and 96 in. long, for interior or semiexposed applications, one side of which is to be nailed against a wall where it will not show, but the other side to be exposed to view and painted, this material should be ordered as follows:

Douglas Fir Plywood: 100 pcs., 3-ply, 48 in. by 96 in.,  
Interior type, A-D grade. Sanded 2 sides to  $\frac{1}{4}$ -in.  
thickness.

9.4. For most uses, sanded panels are desirable, but there are occasional uses where unsanded panels, of an A-D or other grade, are satisfactory. Such panels should be specified unsanded.

9.5. For special types of service, special features may be desirable in plywood panels, such as omission of oiling for concrete-form panels, extra-thick faces for certain architectural treatments, etc. In such cases, the special treatment or feature should be stated after the standard specification. For example, if special features are desired in an Exterior type A-A panel of  $\frac{3}{8}$ -in. thickness, the order should read:

Douglas Fir Plywood: 100 pcs., 3-ply, 48 in. by 96 in.,  
Exterior type, A-A grade. Sanded 2 sides to  $\frac{3}{8}$ -in.  
thickness. (Add further special requirements.)

# REGISTERED GRADE - TRADEMARKS OF DOUGLAS FIR PLYWOOD ASSOCIATION

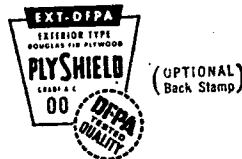
Grade-trademarks, reproduced below, identify panels both as to TYPE of bond between plys and appearance GRADE of outer plys or veneers, as stipulated in U. S. Commercial Standard CS45-55.

## EXTERIOR-TYPE

① **EXT-DFPA-A-A**  
Grade A veneer on both faces.

② **EXT-DFPA-A-B**  
Grade A veneer on face of panel—  
Grade B on back.

③ **EXT-DFPA-PLYSHIELD-A-C**  
Grade A veneer on face—  
Grade C on back.

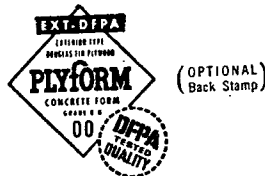


④ **EXT-DFPA-UTILITY-B-C**  
Grade B veneer on face—  
Grade C on back.

⑤ **EXT-DFPA-UNDERLAYMENT**  
Grade C (repaired) veneer on face—  
Grade C on back.

⑥ **EXT-DFPA-SHEATHING-C-C**  
Grade C veneer on both faces of panel.

⑦ **EXT-DFPA-PLYFORM-B-B**  
Grade B veneer on both faces of panel.



## INTERIOR-TYPE

① **INTERIOR-A-A-DFPA**  
Grade A veneer on both faces.

② **INTERIOR-A-B-DFPA**  
Grade A veneer on face—  
Grade B on back.



Grade A veneer on face—  
Grade D on back.

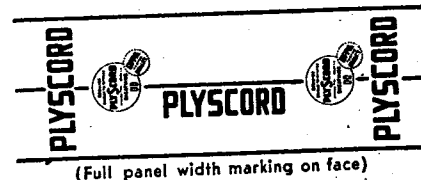


Grade C (repaired) veneer on face—  
Grade D on back.



Grade C on face—  
Grade D on back.

Grade B veneer on face—  
Grade D on back.



③ **INTERIOR-N-D-DFPA**  
Special "natural finish" veneer on face with D back.

④ **INTERIOR-N-N-DFPA**  
Special "natural finish" veneer on each face.



Grade B on both faces of panel—  
Grade C for inner plys.

Douglas Fir Plywood Association,  
Tacoma 2, Washington

FIGURE 5. Inspection certificate of the Douglas Fir Plywood Association (reverse side).

9.6. When ordering overlaid plywood, "High Density Overlay," "Medium Density Overlay," or "Overlaid Plywood Concrete Form" should be specified. The number of pieces, size, and thickness are noted in the same way as for other kinds of plywood. Special requirements, such as "High Density A-A, surfaced 1 side only," or special weights of surfacing material, should be stated after the standard specification.

## 10. NOMENCLATURE AND DEFINITIONS

*Back.*—The side reverse to the face of the panel.

*Borer holes.*—Voids made by wood-boring insects or worms.

*Centers.*—See "Cores."

*Check.*—A partial separation of veneer fibers, usually small and shallow, running parallel to the grain of the wood, and caused chiefly by strains produced in seasoning.

*Cores.*—Cores or centers are the innermost layer in plywood construction.

*Crossbanding.*—Veneer used in the construction of plywood with 5 or more plies. In 5-ply construction it is placed at right angles between the core and faces.

*Defects, open.*—Open checks, open splits, open joints, open cracks, loose knots, and other defects interrupting the smooth continuity of the panel surface.

*Exterior type.*—Refers to the type of plywood intended for outdoor or marine uses. This type is bonded with adhesives, affording the ultimate in water and moisture resistance. (See paragraphs 4.4 and 4.6.) There are several grades within this type.

*Face.*—The better side of a panel in any grade calling for a face and a back; also, either side of a panel where the grading rules draw no distinction between faces. The quality of the face and back determines the grade of a panel within either the Exterior or Interior type.

*Heartwood.*—The darker-colored wood occurring in the inner portion of the tree, sometimes referred to as "heart."

*Interior type.*—Refers to the type of plywood intended for inside uses and for construction applications where subjected to occasional wetting or deposits of moisture. (See paragraphs 4.4 and 4.5.) There are several grades within this type.

*Knot.*—Cross section of a branch or limb whose grain usually runs at right angles to that of the piece in which it is found.

*Knotholes.*—Voids produced by the dropping of knots from the wood in which they were originally embedded.

*Lap.*—A condition where the veneers used are so misplaced that one piece overlaps the other rather than making a smooth butt joint.

*Patches.*—Insertions of boat-shaped sound wood glued and placed into panels from which defective portions have been removed.

*Pitch pocket.*—A well-defined opening between rings of annual growth, usually containing, or which has contained, more or less pitch, either solid or liquid.

*Pitch streak.*—A well-defined accumulation of pitch in a more or less regular streak.

*Plugs.*—Sound wood, usually circular, for replacing defective portions which have been removed. Plugs usually are held in veneer by friction only until veneers are bonded into plywood. Synthetic plugs are of fiber and resin aggregate; they are used to fill openings and provide a smooth, durable surface.

*Sapwood.*—The lighter-colored wood occurring in the outer portion of the tree, sometimes referred to as "sap."

*Shim.*—A long, narrow repair not more than  $\frac{3}{16}$  in. wide.

*Split.*—Complete separation of veneer fibers parallel to grain, caused chiefly by manufacturing process or handling.

*Streaks.*—See "Pitch streak."

*Torn grain.*—A marked leafing or separation on veneer surface between spring and summer wood.

*Veneer.*—Thin sheets of wood.

*Veneer patches.*—Patches inserted in veneer sheet before panel is assembled for pressing.

*60/60, 65/65, 93/93, etc.*—Such optional symbols may be used by manufacturers of overlaid plywood to indicate the weight of the overlay in pounds per 1,000 sq. ft. on each side of the panel. The weight of the overlay includes resin and carrier sheet (or sheets) together, before pressing.

## 11. EFFECTIVE DATE

11.1 Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard was issued by the United States Department of Commerce, effective from February 1, 1955.

EDWIN W. ELY,

Chief, Commodity Standards Division

## HISTORY OF PROJECT

*First edition.*—Pursuant to a request from the manufacturers of Douglas fir plywood, a general conference of manufacturers, distributors, and users of this product was held in Tacoma, Wash., on August 17, 1932, to consider the adoption of standard grading rules for the guidance of the industry. Manufacturers representing approximately 80 percent of the production of Douglas fir plywood were in attendance, as well as others interested in the distribution and use of the product. The standard tentatively drafted by a committee of manufacturers was thoroughly discussed and several constructive changes were made. Following written acceptance by a satisfactory majority, the standard was promulgated as CS45-33, effective from February 15, 1933.

*First revision.*—The standing committee, as a result of an industry conference held in Tacoma, Wash., on August 3, 1936, recommended some modifications in the standard. A recommended revision was circulated on September 11, 1936, for written acceptance, with the result that the revised standard was accepted and authorized by the industry for promulgation as Commercial Standard CS45-36, effective from November 1, 1936.

*Second revision.*—Pursuant to a suggestion by the Federal Housing Administration, and following several conferences between representatives of the Forest Products Laboratory, the FHA, and the plywood manufacturers, a second revision of the standard was proposed. This revision provided for two classes of moisture resistance and changes in the sheathing grade. Upon approval by the standing committee, the revision was circulated to the trade for acceptance on September 16, 1938. Later, the establishment of the revision as Commercial Standard CS45-38, effective for new production from November 10, 1938, was announced.

*Third revision.*—General demand for the various grades of Douglas fir plywood for permanent exterior use led to a proposal by the Douglas Fir Plywood Association to include in the standard, detail requirements for seven distinct grades of the Exterior type. Upon approval by the standing committee the recommended revision was submitted on May 7, 1940, to the trade for consideration, and an announcement

of its acceptance was issued on July 20. The revised standard, designated Commercial Standard CS45-40, became effective for new production from August 20, 1940.

*Fourth revision.*—Pursuant to a request from the Douglas Fir Plywood Association on May 27, 1942, and following approval by the standing committee, the fourth revision was circulated on July 2, 1942, to the trade for acceptance. The purpose of this revision was to make adjustments in the moisture-resistant type so as to speed up the production of those grades and sizes essential for defense construction. The major changes were the elimination of the grades good 2 sides and good 1 side, the addition of a new grade, sound 1 side, and a considerable reduction in the number of standard panel sizes. This revision superseded both CS45-40 (Domestic Grades) and CS45E-36 (Export Grades), since Douglas fir plywood was then being graded on the same basis whether for domestic or export purposes. Acceptance of the revision and its establishment as Commercial Standard CS45-42, was announced on October 30, 1942. The revised standard became effective for new production from November 16, 1942.

*Fifth revision.*—The experience gained by our armed forces in the use of plywood for various marine applications led to the development of an improved grade for such use. On June 22, 1944, the Douglas Fir Plywood Association submitted a proposed revision of the standard, which was unanimously approved by the standing committee. On July 31, 1944, the recommended revision was circulated to the trade for acceptance, and on December 27, the establishment of the revision as Commercial Standard CS45-45, effective from January 27, 1945, was announced.

*Sixth revision.*—On April 14, 1947, the Douglas Fir Plywood Association submitted a proposed revision in which the major changes were a reduction in the number of grades; renaming moisture-resistant type as Interior type; permitting the use of western hemlock, Sitka spruce, noble fir, and other western softwood species in the inner plies of sound 2 sides, sound 1 side, industrial, and door panel grades in the Interior type only; increasing the number of cycles of the bondage test for the Interior type from 2 to an average of 10; and including a fire test for Exterior type bondage. These changes were approved by the standing committee, and the recommended revision was circulated on June 5, 1947, to those directly concerned for acceptance. An announcement of the establishment of the revision as CS45-47 was issued on August 15, 1947.

*Seventh revision.*—The Douglas Fir Plywood Association, on May 21, 1948, submitted a proposed revision of the standard in an improved and simpler form. After approval by the standing committee the recommended revision was circulated to the trade for consideration on August 5, 1948. This revision gave the requirements for the four basic standard grades of veneer, and the plywood grades as made up from these veneers were covered in tables. The bondage requirements for both the Interior and Exterior types were made more rigid, thus insuring greater durability of the product. The establishment of the revision as Commercial Standard CS45-48 was announced on October 1, 1948.

*Eighth revision.*—The Douglas Fir Plywood Association, on March 12, 1954, submitted a revision of CS45-48 prepared by a technical committee of the association, and adjusted after having been circulated several times to the industry for advance consideration.

The principal changes consisted of: (1) Provisions for overlaid plywood, two "natural finish" panels, and an Underlayment grade; (2) requirements that exposed veneer shall have the bark side out, that tape in the glue line be prohibited, and that moisture content of panels shall not exceed 18 percent at time of shipment; (3) a ring count limitation for face grades, limitation of defects in grade *A* faces, modification in grade *B* veneer, and requirement of a 5-percent mold inhibitor in the adhesive used in some Interior grades; (4) adjustment of the tables of standard stock sizes to eliminate odd sizes but to include those sizes normally carried in stock by jobbers and wholesalers; (5) a new requirement for assuring straight edges on finished panels; and (6) modification of several definitions to clarify present misunderstandings, and addition of a definition for "shop-cutting panel."

After approval of the recommended revision by the standing committee, it was circulated to the trade for consideration on October 1, 1954, and was subsequently accepted by a satisfactory majority of the entire industry. On January 3, 1955, the establishment of the revision as Commercial Standard CS45-55, effective from February 1, 1955, was announced.

Project Manager: H. A. Bonnet, Commodity Standards Division, Office of Technical Services.

Technical Adviser: G. W. Shaw, Building Technology Division, National Bureau of Standards.

#### STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, which acts as secretary for the committee.

ARNOLD KOUTONEN, St. Paul & Tacoma Lumber Co., Olympia, Wash. (chairman).  
NELSON S. PERKINS, Douglas Fir Plywood Association, 1119 A St., Tacoma, Wash.  
JACK REHM, Harbor Plywood Corp., Hoquiam, Wash.  
R. W. JACOB, John Bader Lumber Co., 2020 Clybourne Ave., Chicago, Ill.  
HARRY H. STEIDLE, Prefabricated Home Manufacturers Institute, 908 20th St. NW., Washington, D. C.  
C. O. CHRISTENSON, National Association of Home Builders of the United States, 1028 Connecticut Ave. NW., Washington, D. C.  
J. STANLEY YOUNG, Property Requirements Section, Federal Housing Administration, 1001 Vermont Ave. NW., Washington 25, D. C.



**ACCEPTANCE OF COMMERCIAL STANDARD**

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date \_\_\_\_\_

Commodity Standards Division,  
Office of Technical Services,  
U. S. Department of Commerce,  
Washington 25, D. C.

Gentlemen:

We believe that this Commercial Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production <sup>1</sup>      distribution <sup>1</sup>      purchase <sup>1</sup>      testing <sup>1</sup>

of Douglas fir plywood. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those products which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_  
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_  
(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore the one that applies. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

## ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, purchase, or testing of Douglas fir plywood. In accepting the standard they reserved the right to depart from it as they individually deem advisable. It is expected that products which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

### ASSOCIATIONS

(General Support)

Douglas Fir Plywood Association, Tacoma, Wash.  
Hardwood Plywood Institute, Chicago, Ill.  
Prefabricated Home Manufacturers Institute, Washington, D. C.

### FIRMS AND OTHER INTERESTS

Aberdeen Plywood Corp., Aberdeen, Wash.  
Adams, Franklin O., Tampa, Fla.  
Algoma Plywood & Veneer Co., Algoma, Wis.  
Allen Millwork Manufacturing Corp., Shreveport, La.  
American Sash & Door Co., Kansas City, Mo.  
Anacortes Veneer, Inc., Anacortes, Wash.  
Andrews, C. E., Lumber Co., New Bethlehem, Pa.  
Arcata Plywood Corp., Arcata, Calif.  
Associated Door & Plywood Co., Chicago, Ill.  
Associated Plywood Mills, Inc., Eugene, Oreg.  
Astoria Plywood Corp., Astoria, Oreg.  
Bader, John, Lumber Co., Chicago, Ill.  
Baldridge, J. C., Lumber Co., Inc., Albuquerque, N. Mex.  
Baltimore & Ohio Railroad Co., Baltimore, Md.  
Bank Building & Equipment Corporation of America, St. Louis, Mo.  
Baxter, C. B., & Co., Kansas City, Mo.  
Berger, F. E.-R. L. Kelley & Associates, Champaign, Ill.  
Besch, Carl, Co., Inc., New York, N. Y.  
Birmingham Sash & Door Co., Birmingham, Ala.  
Borden Co., Chemical Division, Seattle, Wash.  
Bosman & Casson, Inc., Harrison, N. J.  
Brookings Plywood Corp., Brookings, Oreg.  
Bruett, T. A., Lumber, Inc., Milwaukee, Wis.  
Buell & Co., Dallas, Tex.  
Buffalo Plywood Corp., Buffalo, N. Y.  
Buffelen Manufacturing Co., Tacoma, Wash.  
California Builders Supply Co., Oakland, Calif.  
California Door Company of Los Angeles, Los Angeles, Calif.  
California Pacific Plywoods, Inc., Sonoma, Calif.  
California Panel & Veneer Co., Los Angeles, Calif.  
Camlet, J. Thomas, Passaic, N. J.  
Campbell & McLean, Inc., Eugene, Oreg.  
Cannon & Mullen, Salt Lake City, Utah  
Cascades Plywood Corp., Portland, Oreg.  
Central Building Supply, Inc., Baltimore, Md.  
Centralia Plywood, Inc., Centralia, Wash.  
Charlottesville Lumber Co., Inc., Charlottesville, Va.  
Cincinnati Butchers Supply Co., Cincinnati, Ohio  
Clear Fir Sales Co., Springfield, Oreg.  
Coast Sash & Door Co., Tacoma, Wash.  
Columbia Plywood Co., Inc., Seattle, Wash.  
Combs Lumber Co., Inc., Lexington, Ky.  
Concrete Grid Forms, Berkeley, Calif.  
Conrad & Cummings, Binghamton, N. Y.  
Continental Forest Products Co., Cedar Rapids, Iowa  
Coos Bay Lumber Co., Coos Bay, Oreg.  
Crane Co., Chicago, Ill.  
Crowell, Lancaster & Higgins, Bangor, Maine  
Curran Bros., Pomona, Calif.  
Curtis Cos., Inc., Clinton, Iowa  
Deats Sash & Door Co., Los Angeles, Calif.  
Dickerson Lumber Co., Huntington, W. Va.  
Downes Lumber Co., Boston, Mass.  
Durable Plywood Co., Calpella, Calif.

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.  
Eastern Plywood & Door Co., Inc., Jamestown, N. Y.  
Elizabeth Lumber Co., Inc., Elizabeth, N. J.  
Elliott Bay Mill Co., Seattle, Wash.  
Elma Plywood Corp., Elma, Wash.  
Evans Products Co., Coos Bay, Oreg.  
Everett Plywood & Door Corp., Everett, Wash.  
Fischer, Charles F., & Co., Inc., New York, N. Y.  
Flannagan, Eric G., & Sons, Henderson, N. C.  
Florence Manufacturing Co., Inglewood, Calif.  
Forest Products Corp., Fort Lauderdale, Fla.  
Fortuna Veneer Co., Fortuna, Calif.  
Frost Hardwood Lumber Co., San Diego, Calif.  
Fry-Fulton Lumber Co., St. Louis, Mo.  
Gaines Hardwood Lumber Co., St. Louis, Mo.  
General Box Co., Des Plaines, Ill.  
Georgia-Pacific Plywood Co., Olympia, Wash.  
Goshen Sash & Door Co., Goshen, Ind.  
Grand Rapids Store Equipment Co., Grand Rapids, Mich.  
Green Gable Builders, Inc., Cedar Rapids, Iowa  
Grogan-Robinson Lumber Co., Great Falls, Mont.  
Gulf States Plywood Co., New Orleans, La.  
Hager & Cove Lumber Co., Lansing, Mich.  
Hahn, Stanley W., Chicago, Ill.  
Harbor Plywood Corp., Aberdeen, Wash.  
Harbor Plywood Corp., Cincinnati, Ohio  
Harbor Plywood Corporation of Indiana, Indianapolis, Ind.  
Harbor Sales Co., Inc., Baltimore, Md.  
Harbor Sales Co., Inc., Washington, D. C.  
Hardel Mutual Plywood Corp., Olympia, Wash.  
Haskelite Manufacturing Corp., Grand Rapids, Mich.  
Hastings, A. W., & Co., Inc., Somerville, Mass.  
Hernsdorf Fixture Manufacturing Co., Inc., Manchester, N. H.  
Hines, Edward, Lumber Co., Westfir, Oreg.  
Houston Sash & Door Co., Houston, Tex.  
Humboldt Plywood Corp., Arcata, Calif.  
Huss Lumber Co., Chicago, Ill.  
Huttig Sash & Door Co., Inc., St. Louis, Mo.; Charlotte, N. C.; Columbus, Ohio; Dallas, Tex.; Jacksonville, Fla.; Knoxville, Tenn.; Louisville, Ky.; Miami, Fla.; Nashville, Tenn.; and Roanoke, Va.  
Industrial Plywood Corp., Willits, Calif.  
Jacksonville Sash & Door Co., Jacksonville, Fla.  
Kansas, State of, Department of Administration, Purchasing Division, Topeka, Kans.  
Keely, Hal, Plywood Co., Pittsburgh, Pa.  
Keith, L. J., & Son, Inc., Fairfield, Ill.  
Kullberg Manufacturing Co., Minneapolis, Minn.  
Lambert Lumber Co., Leavenworth, Kans.  
Law, Law, Potter & Nystrom, Madison, Wis.  
Levi, Solomon, Brooklyn, N. Y.  
Linn Plywood Corp., Albany, Oreg.  
Long-Bell Lumber Co., Longview, Wash.  
Long-Bell Lumber Co., Gardiner Division, Plywood Department, Gardiner, Oreg.  
Lord & Bushnell Lumber Co., Chicago, Ill.  
Los Angeles, City of, Los Angeles, Calif.  
Lumber & Millwork Company of Philadelphia, Philadelphia, Pa.  
Lyons Lumber & Supply Corp., Jamestown, N. Y.  
Mahoney Sash & Door Co., Canton, Ohio  
Marsh & Truman Lumber Co., Chicago, Ill.  
Martin Bros. Box Company of Oregon, Oakland, Oreg.  
McPhillips Manufacturing Co., Inc., Mobile, Ala.  
Medford Veneer & Plywood Corp., Medford, Oreg.  
Memphis Sash & Door Co., Memphis, Tenn.

Menasha Plywood Corp., North Bend, Oreg.  
 Merritt Lumber Yards, Inc., Reading, Pa.  
 Miller & Vrydagh, Terre Haute, Ind.  
 Milwaukie Plywood & Door, Inc., Milwaukie, Oreg.  
 Minot Builders Supply Co., Inc., Minot, N. Dak.  
 Moore Dry Dock Co., Oakland, Calif.  
 Morrison-Merrill & Co., Salt Lake City, Utah  
 Mt. Baker Plywood, Inc., Bellingham, Wash.  
 Muhlenberg Bros., Wyomissing, Pa.  
 Multnomah Plywood Corp., Portland, Oreg.  
 Mutual Plywood Corp., Eureka, Calif.  
 National Plywood Co., Inc., New York, N. Y.  
 National Woodworks, Inc., Birmingham, Ala.  
 New York Wood Working Corp., New York, N. Y.  
 North Pacific Plywood, Inc., Tacoma, Wash.  
 Northwest Door Co., Tacoma, Wash.  
 Nurenborg, W. S., Fort Worth, Tex.  
 Oklahoma Sash & Door Co., Oklahoma City, Okla.  
 Oregon-Washington Plywood Co., Garibaldi, Oreg.  
 Owens-Parks Lumber Co., Los Angeles, Calif.  
 Pacific Veneer & Plywood Corp., Bellingham, Wash.  
 Paragon Plywood Corp., Crescent City, Calif.  
 Patten-Blinn Lumber Co., Los Angeles, Calif.  
 Patterson-Buck Hardwood Co., Dearborn, Mich.  
 Patzig Testing Laboratories, Des Moines, Iowa  
 Pease Woodwork Co., Hamilton, Ohio  
 Peninsula Plywood Corp., Port Angeles, Wash.  
 Pilchuck Plywood, Arlington, Wash.  
 Pluswood Industries, Oshkosh, Wis.  
 Plywood Inc., Kalpine Plywood Co. Division,  
 Trenton, N. J.  
 Plywood Manufacturing of California, Inc., Los  
 Angeles, Calif.  
 Portsmouth Lumber Corp., Portsmouth, Va.  
 Puget Sound Plywood, Inc., Tacoma, Wash.  
 Ramsey, A. H., & Sons, Inc., Miami, Fla.  
 Rathborne, Jos., Land & Lumber Co., Inc., Harvey,  
 La.  
 Rawlings, Wayne, Plywood Sales Co., San Fran-  
 cisco, Calif.  
 Reeb Millwork Corp., Roselle, N. J.  
 Reliable Box & Lumber Co., Newark, N. J.  
 Ripley-Hopping Inc., Newark, N. J.  
 Rochlin Veneer & Plywood Co., Arcata, Calif.  
 Roseburg Lumber Co., Roseburg, Oreg.  
 Royal Oak Wholesale Co., Royal Oak, Mich.  
 Rudinger, C. R., Inc., South Kearny, N. J.  
 Russell, Mullgardt, Schwarz, Van Hoefen, St. Louis,  
 Mo.  
 Rust Sash & Door Co., Kansas City, Mo.  
 St. Paul & Tacoma Lumber Co., Plywood Division,  
 Olympia, Wash.  
 St. Paul & Tacoma Lumber Co., Tacoma, Wash.  
 San Diego, City of, Engineering Department, San  
 Diego, Calif.  
 Sash, Door & Glass Corp., Richmond, Va.  
 Sears, Roebuck & Co., Chicago, Ill.  
 Shenk, Henry, Co., Erie, Pa.  
 Simpson Logging Co., Shelton, Wash.  
 Sleeper, Harold R., New York, N. Y.  
 Snellstrom Lumber Co., Eugene, Oreg.  
 Sonoma Plywood Co., Sonoma, Calif.  
 South Side Lumber & Supply, Toledo, Ohio

Southern Oregon Plywoods, Inc., Grants Pass, Oreg.  
 Southwestern Sash & Door Co., Joplin, Mo.  
 Spiegel, Inc., Chicago, Ill.  
 Standard Lumber Co., Spokane, Wash.  
 Standard Veneer & Timber Co., Crescent City,  
 Calif.  
 Steele & Hibbard Lumber Co., St. Louis, Mo.  
 Stevenson Plywood Corp., Stevenson, Wash.  
 Stoetzel, Ralph, Chicago, Ill.  
 Stravs, Carl B., Minneapolis, Minn.  
 Swan Lake Moulding Co., Klamath Falls, Oreg.  
 Sweets Catalog Service, New York, N. Y. (General  
 support.)  
 Synvar Corp., Wilmington, Del.  
 Technical Training Aids, Inc., Tulsa, Okla.  
 Tennessee Glass Co., Nashville, Tenn.  
 Timberline, Inc., Kansas City, Mo.  
 Trexler Lumber Co., Allentown, Pa.  
 Umpqua Plywood Corp., Roseburg and Myrtle  
 Creek, Oreg.  
 Underwood Builders Supply Co., Mobile, Ala.  
 United States Plywood Corp., Anderson, Calif.;  
 Mapleton, Oreg.  
 United States Plywood Corp. (Northwest Division),  
 Seattle, Wash.  
 Vancouver Plywood Co., Vancouver, Wash.  
 Veneer Products Co., Medford, Oreg.  
 Victoria Sash & Door Co., Inc., Shreveport, La.  
 Walton Plywood Co., Inc., Everett, Wash.  
 Wanke Panel Co., Portland, Oreg.  
 Waples-Painter Co., Gainesville, Tex.  
 Warren Wholesale Co., Nashville, Tenn.  
 Watertown Sash & Door Co., Watertown, S. Dak.  
 Welch, Carroll E., Huntington, N. Y.  
 West Coast Plywood Co., Aberdeen, Wash.  
 Western Door & Sash Co., Oakland, Calif.  
 Western Pine Supply Co., Emeryville, Calif.  
 Western States Plywood Cooperative, Port Orford,  
 Oreg.  
 Western Veneer & Plywood Co., Portland, Oreg.  
 Weyerhaeuser Sales Co., Tacoma, Wash.  
 Whissel, L. N., Lumber Co., Inc., Buffalo, N. Y.  
 White, H. A., Lumber Co., Seattle, Wash.  
 Wilbur Lumber Co., West Allis, Wis.  
 Wood Lumber Co., Birmingham, Ala.  
 Woodward Lumber Co., Seattle, Wash.  
 Zeesman Plywood Corp., Los Angeles, Calif.

#### U. S. GOVERNMENT AGENCIES

Bureau of Engraving and Printing, Washington,  
 D. C.  
 Bureau of Yards and Docks, Department of the  
 Navy, Washington, D. C.  
 Department of the Army, Office, Deputy Chief of  
 Staff for Logistics, Washington, D. C.  
 Public Buildings Service, General Services Admin-  
 istration, Washington, D. C.  
 Quartermaster Research and Development Com-  
 mand, U. A. Army, Natick, Mass.  
 Veterans Administration, Washington, D. C.  
 Wright Air Development Center, Wright-Patterson  
 Air Force Base, Ohio.

#### OTHER COMMERCIAL STANDARDS

A list of all effective Commercial Standards may be obtained from the Com-  
 modity Standards Division, Office of Technical Services, U. S. Department of  
 Commerce, Washington 25, D. C. These publications may be purchased at the  
 prices indicated on the list, which also includes directions for ordering copies.